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DIVISION 02 - SITE CONSTRUCTION

SECTION 02715

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06/04

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SECTION 02715

LIMEROCK BASE COURSE
06/04

NOTE: Delete, revise, or add to the text in this
section to cover project requirements. Notes are
for designer information and will not appear in the
final project specification.

This section covers a limerock base course applied
directly under the bituminous surface course. Base
course is usually placed on a subgrade specified in
Section 02315 EXCAVATION AND FILL," or Section 02330
EMBANKMENT or on a surface course as specified.

PART 1 GENERAL

1.1 REFERENCES

NOTE: The following references should not be
manually edited except to add new references.
References not used in the text will automatically
be deleted from this section of the project
specification.

The publications listed below form a part of this section to the extent
referenced:

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO M 147	(1965; R 2000) Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses
AASHTO T 180	(2001) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
AASHTO T 2	(2000) Sampling of Aggregates
AASHTO T 87	(1986; R 2000) the Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T 89	(2002) Determining the Liquid Limit of

Soils

AASHTO T 90 (2000) Determining the Plastic Limit and Plasticity Index of Soils

ASTM INTERNATIONAL (ASTM)

ASTM C 117 (2003) Standard Test Method for Materials Finer than 75-micrometer (No. 200) Sieve in Mineral Aggregates by Washing

ASTM C 136 (2001) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

ASTM D 1556 (2000) Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D 2922 (2001) Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 4318 (2000) Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

SD-01 Preconstruction Submittals

Construction Equipment List shall be submitted for approval.

SD-06 Test Reports

Test reports for Limerock shall be submitted according to the paragraph entitled, "Quality Control Testing During Construction," of this section.

SD-07 Certificates

Certificates for Waybills and Delivery Tickets shall be submitted in accordance with paragraph entitled, "Approval of Materials," of this section.

1.3 APPROVAL OF MATERIALS

**NOTE: Change number of calendar days as required to
suit project scheduling.**

Test results from samples shall be submitted by the Contractor not less than 30 calendar days before material is required in the work. Final approval shall be required prior to delivery of any material.

[Certificates for Waybills and Delivery Tickets shall be submitted by the Contractor. Job contract number and name, along with a signature of the Contracting Officer shall appear on the delivery tickets.]

1.4 OPERATION OF MATERIAL SOURCES

Clearing, stripping, and excavating involved in the operation of pits or quarries shall be performed by the Contractor. Upon completion of work, pits or quarries on Government property shall be conditioned to drain and left in an approved condition. Pits or quarries on private lands shall be conditioned in agreement with the local laws and authorities.

1.5 SAMPLING AND TESTING

1.5.1 Tests for Proposed Limerock Materials

**NOTE: Delete the first of the following paragraphs
when soil testing will be provided by the
Contractor. Delete the second when soil testing
will be provided by the Government.**

[Limerock proposed for use in the work will be tested by the Government and copies of the test results will be submitted at least 30 calendar days prior to the start of the work, as follows:]

[Limerock proposed for use in the work shall be tested and copies of the test results submitted by the Contractor at least 10 calendar days prior to start of the work, as follows:]

PROPOSED LIMEROCK MATERIAL

<u>MATERIAL</u>	<u>REQUIREMENT</u>	<u>TEST METHOD</u>	<u>SOIL MATERIAL TESTED AND NUMBER OF TESTS</u>
Limerock	Sampling	AASHTO T 2	One for each source of material
	Preparation of samples	AASHTO T 87	
	Sieve analysis of fine and coarse aggregate	ASTM C 136	

PROPOSED LIMEROCK MATERIAL

<u>MATERIAL</u>	<u>REQUIREMENT</u>	<u>TEST METHOD</u>	<u>SOIL MATERIAL TESTED AND NUMBER OF TESTS</u>
	Amount of material passing 75 micrometer (No. 200) sieve in aggregate	ASTM C 117	
	Liquid limit of soils	ASTM D 4318	
	Plastic limit of soils	ASTM D 4318	
	Plasticity index of soils	ASTM D 4318	
	Moisture- density- relations	AASHTO T 180, method B or D	

1.5.2 Quality Control Testing During Construction

**NOTE: Delete the first of the following paragraphs
when testing will be provided by the Contractor.
Delete the second when testing will be provided by
the Government.**

[Limerock delivered to the project site and each 6-inch 150 millimeter
layer of material-in-place (after compaction) will be tested by the
Government; samples of each material will be submitted for quality control
during construction as follows:]

[Limerock delivered to the project site and each 6-inch 150 millimeter
layer of material-in-place (after compaction) shall be sampled by the
Contractor and tested as follows:]

TESTING DURING CONSTRUCTION

<u>MATERIAL</u>	<u>REQUIREMENT</u>	<u>TEST METHOD</u>	<u>NUMBER OF TESTS</u>
Limerock	Sieve analysis of fine and coarse aggregate	ASTM C 136 ASTM C 117	One daily; additional test when there is an apparent change
	Amount of material passing No. 200 75 micrometer sieve in aggregate		

TESTING DURING CONSTRUCTION

<u>MATERIAL</u>	<u>REQUIREMENT</u>	<u>TEST METHOD</u>	<u>NUMBER OF TESTS</u>
	Density of in-place material	ASTM D 1556 Sand-Cone Method or ASTM D 2922, Nuclear Method (when approved by the Contract- ing Officer)	At least three daily for each subgrade soil material and for each 6-inch 150 mm layer of crushed stone pavement material; additional test when there are any changes in moisture conditions

1.5.3 Reports

**NOTE: Delete the paragraph heading and the
following paragraph when soil testing will be
provided by the Government.**

Contractor's testing service shall report in writing all test results the same day that tests are made.

1.5.4 Evaluation of Test Results

Results of density in-place tests shall be considered satisfactory if the average of any four consecutive density tests which may be selected is in each instance equal to or greater than the specified density, and if not more than one density test in four has a value more than two percentage points below the specified density.

1.6 CONSTRUCTION EQUIPMENT LIST

Construction equipment list for all major equipment used for transporting, spreading and finishing shall be submitted to the Contracting Officer prior to construction.

PART 2 PRODUCTS

2.1 MATERIALS

Limerock shall consist of fossiliferous limestone of uniform quality, containing no hard or flinty pieces in sufficient quantity to prevent construction of a smooth pavement surface free of pits or pockets. Limerock shall be obtained from pits where overburden has been removed previous to blasting. Limerock shall show no tendency to air-slake and shall undergo no chemical change when exposed to weather; it shall contain not more than three percent roots, leaf mold, or other organic matter. Broken limerock shall conform to the following gradation: 100 percent shall pass a 3-1/2-inch 90 millimeter mesh sieve and shall be continuously well graded down to dust. Fine materials shall consist of the dust and fine particles of fracture. In no case will material be permitted which has a liquid limit in excess of 35 or a plasticity index in excess of 10 when tested in accordance with [AASHTO M 147,] AASHTO T 89, AASHTO T 90.

Chemical analysis of limerock shall consist of determining the insoluble silica, the iron oxide, and the alumina by solution of sample in hydrochloric acid; by evaporating, dehydrating, redissolving, and neutralizing the residue with ammonium hydroxide; and by filtering, washing, and igniting the residue limerock. The difference between the percentage of insoluble matter and 100 percent is reported as carbonates of calcium and magnesium. Limerock shall be:

**NOTE: Type of limerock not applicable to job
conditions must be deleted.**

Composed of not less than 97 percent of carbonates of calcium and magnesium.

Composed of not less than 75 percent of carbonates of calcium and magnesium and not more than 2 percent of oxides of iron and aluminum. Any components other than the carbonates and oxides shall be silica.

PART 3 EXECUTION

3.1 PREPARATION OF SUBGRADE OR SUBBASE COURSE

Prior to constructing the limerock base course, the previously constructed subgrade course shall be cleaned of foreign substances. Surface of the subgrade or subbase course shall be inspected for adequate compaction and surface tolerances.

**NOTE: Select the applicable base type and section
titles and delete inapplicable base type and section
titles.**

Subgrade shall conform to the requirements of Section 02315 EXCAVATION AND FILL.

Subgrade for limerock base course shall be as specified in Section 02330 EMBANKMENT.

Ruts or soft, yielding spots that may appear in the subgrade or subbase course, areas having inadequate compaction, and deviations of the surface from the requirements in the applicable section shall be corrected. Correction shall be performed by loosening the affected areas, removing unsatisfactory material, adding approved material, and by reshaping and recompacting to line and grade to the specified density requirements, as directed.

3.2 GRADE CONTROL

Finished and completed surface course shall conform to lines, grades, cross sections, and dimensions as indicated. Lines and grades shall be maintained by means of line and grade stakes placed at the worksite.

3.3 FURNISHING WATER

NOTE: When the "Special Provisions" adequately

**provide for sufficient water for the construction of
the base course, this paragraph must be deleted.**

Provisions shall be made by the Contractor for furnishing water at the site of the work by equipment of such capacity and design as will ensure application of the approved amounts for each of the construction operations in the following paragraphs.

3.4 PLACING AND SPREADING

Transporting of limerock over finished subgrade or subbase course will be permitted only when approved. Rutting shall be repaired as described in the paragraph entitled, "Preparation of Subgrade or Subbase Course." Limerock shall be transported in approved vehicles over the previously placed course to the areas under construction, and shall be dumped at the end of the spread limerock. Limerock shall be spread uniformly on the subgrade or subbase course by means of shovels, forks, bulldozers, or other approved equipment. Loose thickness of the layer shall be such that the compaction requirements will be obtained and the compacted thickness will conform to the thickness of the layer as indicated. Compacted thickness of a single layer of limerock base course shall not exceed 6 inches 150 millimeter. When more than one layer of base course is required, the first layer shall be constructed to not less than 4-inches 100 millimeter compacted thickness. Prior to the spreading of any material for the upper course, the lower course shall have passed all required compaction tests to the satisfaction of the Contracting Officer. Surface cross section of the lower course shall be approximately parallel to the finished line and grade. Portions of a layer that become segregated in spreading shall be corrected, or if necessary, replaced with satisfactory material.

Surface of each layer of base course shall be compacted to the line and grade indicated.

Rolling and blading shall continue until entire depth of the layer is bonded and compacted to at least 98 percent minimum density for roads and 95 percent minimum density for shoulders, turnouts, and crossovers. Additional water shall be applied to the limerock during rolling operations to obtain the density specified. In areas not accessible to rollers, the limerock shall be tamped with approved mechanical tampers to the density specified. If at any time the subgrade or subbase course becomes mixed with the limerock, the Contractor shall remove the affected mixture, reshape and compact the subgrade or subbase course, and replace the limerock base course. Cracks, checks, or other defects in the finished base course shall be removed by scarifying to a depth of 4-inches 100 millimeter, reshaping, adding limerock as required, and recompacting as directed by the Contracting Officer.

3.5 PROOF ROLLING

**NOTE: Delete the following paragraph when this
section is used for construction of roads, open
storage areas, and areas of similar use.**

Proof rolling of the areas designated shall be in addition to the compaction specified above. Proof rolling shall consist of the application

of 30 coverages with a heavy pneumatic-tired roller having 4 or more tires, each loaded to a minimum of 30,000 pounds 15,000 kilogram and inflated to a minimum of 150 pounds per square inch 1050 kilopascal. Proof rolling shall be applied to the top lift of the layer where the base course is laid and to each layer of the base course. Water content of the top lift of the layer on which base course is laid shall be maintained at the percentage directed from the start of compaction to the completion of proof rolling. Materials in the base course or underlying materials indicated as unsatisfactory by the proof rolling shall be replaced with satisfactory materials and recompact, as directed.

3.6 EDGES OF BASE COURSE

Approved material shall be placed along edges of the base course in such quantity as will compact to the thickness of course being constructed or, when the course is being constructed in two or more layers, to the thickness of each layer of the course. In each operation, at least a 1-foot 300 millimeter width of the shoulder to be rolled and compacted simultaneously with the rolling and compacting of each layer of the base course shall be allowed.

3.7 SMOOTHNESS TEST

**NOTE: On the basis of local conditions, a 12-foot
4-meter (12-foot) straightedge may be specified with
deviations unchanged.**

The finished surface shall indicate no deviations in excess of 3/8-inch 9.5 millimeter when tested with a 10-foot 3 meter straightedge applied parallel with, and at right angles to, centerline of the paved area. Deviations exceeding 3/8-inch 9.5 millimeter shall be corrected by scarifying to a depth of 4-inches 100 millimeter, removing or adding limerock as may be required, reshaping, watering, and compacting, until approved. When the base course is constructed in more than one layer, the smoothness requirements shall apply to the top layer.

3.8 MAINTENANCE

Limerock base course shall be maintained to meet all requirements specified herein until prime coat is applied. If the finished surface of the base course has become so glazed that the prime coat will not readily penetrate, the glaze shall be removed, prior to applying the prime coat, by blading, power brooms, or other equipment, as directed by the Contracting Officer.

-- End of Section --